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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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*Ex parte* DAVID M. THOMPSON, CYNTHIA A. HOOVER,
JOHN D. PECK, and MICHAEL M. LITWIN

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Appeal 2010-001212
Application 10/685,785
Technology Center 1700

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Before BRADLEY R. GARRIS, CATHERINE Q. TIMM, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

## DECISION ON APPEAL[1]

## I. STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134 from the Examiner's decision to reject claims 1-13, 16-22, 24, 25, 28-32, 34, and 37-39 under

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

35 U.S.C. § 103(a) as unpatentable over Okamoto (US 6,465,669 B1; Oct. 15, 2002) in view of Sievers (US 4,970,093; Nov. 13, 1990) and claims 14, 15, 35, and 36 under 35 U.S.C. § 103(a) as unpatentable over Okamoto in view of Sievers and Soininen (US 6,482,740 B2; Nov. 19, 2002). We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

Appellants' invention relates to a deposition process to produce a material, such as a film, coating or powder, that includes a Group 8 (VIII) metal and/or a Group 8 (VIII) metal oxide (Spec. 4:2-4). Claims 1, 19, and 20 are illustrative:

> 1. A process for producing at least one member of the group consisting of a film, a coating and a powder, comprising the step of decomposing at least one asymmetric metallocene precursor having a general formula CpMCp',
>
> where
>
> M is a metal selected from the group consisting of Ru, Os and Fe;
>
> Cp is a first substituted cyclopentadienyl or a cyclopentadienyl-like moiety that includes at least one substituent group $D_1$;
>
> Cp' is a second substituted cyclopentadienyl or a cyclopentadienyl- like moiety that includes at least one substituent group $D_1'$;
>
> wherein
>
> $D_1$ is different from $D_1'$;
>
> $D_1$ is selected from the group consisting of:
>
> X;
> $C_{a1}H_{b1}X_{c1}$;

$C_{a2}H_{b2}X_{c2}(C=O)C_{al}H_{bl}X_{cl}$;
$C_{a2}H_{b2}X_{c2}OC_{al}H_{bl}X_{cl}$;
$C_{a2}H_{b2}X_{c2}(C=O)OC_{al}H_{bl}X_{cl}$; and
$C_{a2}H_{b2}X_{c2}O(C=O)C_{al}H_{bl}X_{cl}$;

where

X is a halogen atom;
a1 is an integer from 2 to 8;
b1 is an integer from 0 to 2(al)+1 –c1;
c1 is an integer from 0 to 2(al)+1 – b1;
b1 + c1 is at least 1;
a2 is an integer from 0 to 8;
b2 is an integer from 0 to 2(a2) + 1 - c2;
c2 is an integer from 0 to 2(a2) + 1 - b2; and

$D_1'$ is selected from the group consisting of:

X
$C_{a1}H_{b1}X_{c1}$,
$C_{a2}H_{b2}X_{c2}(C=O)C_{al}H_{bl}X_{cl}$,
$C_{a2}H_{b2}X_{c2}OC_{al}H_{bl}X_{cl}$,
$C_{a2}H_{b2}X_{c2}(C=O)OC_{al}H_{bl}X_{cl}$, and
$C_{a2}H_{b2}X_{c2}O(C=O)C_{al}H_{bl}X_{cl}$

where,

X is Fl, Cl, Br or I;
a1 is an integer from 1 to 8;
b1 is an integer from 0 to 2(a1)+1 – c1;
c1 is an integer from 0 to 2(a1)+1 – b1;
b1 + c1 is equal to or greater than 1;
a2 is an integer from 0 to 8;
b2 is an integer from 0 to 2(a2)+1 - c2;
c2 is an integer from 0 to 2(a2)+1 - b2; and
b2 + c2 is equal to or greater than 1,

thereby producing the film, coating or powder; wherein the decomposition is conducted in the presence of a solvent fluid.

> 19. The process of Claim 2, wherein said precursor is 1-methyl,1'-ethyl ruthenocene.
>
> 20. The process of Claim 2 wherein $D_1$ is methyl and $D_1'$ is selected from the group consisting of ethyl, propyl, isopropyl, n-butyl, sec-butyl and tert-butyl.

## II. CLAIM 1

Appellants present arguments to claims 1-13, 16-22, 24, 25, 28-32, 34, and 37-39 as a group (Br. 4-7), for which we select claim 1 as a representative claim.

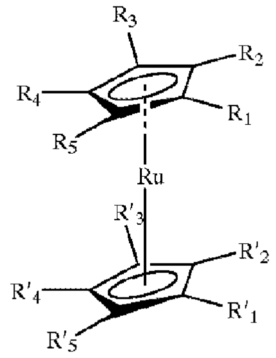
### A. ISSUE ON APPEAL

A first issue on appeal arising from the contentions of Appellants and the Examiner is: does the evidence support the Appellants' view that the Examiner erred in concluding that a step of decomposing at least one asymmetric metallocene precursor having a general formula CpMCp' (i.e., where one cyclopentadienyl is substituted with a different substituent than the other cyclopentadienyl) would have been obvious to one of ordinary skill in the art based on the teachings of Okamoto? We answer this question in the negative.

### B. DISCUSSION

Appellants contend that Okamoto does not disclose asymmetric metallocene precursors, but rather teaches away from asymmetric metallocene precursors by exemplifying only symmetric compounds or compounds in which only one cyclopentadienyl is substituted (Br. 5).

The Examiner relies on the teaching of the general formula in Okamoto shown below:



> wherein at least one of the substituents $R_1$, $R_2$, $R_3$, $R_4$, $R_5$, $R_1$, $R_2$', $R_3$', $R_4$', and $R_5$' in the two 5-membered rings comprises an alkyl group selected from $CH_2CH_3$, $CH_2CH_2CH_3$, $CH_2CH_2CH_2CH_3$, $C(CH_3)_3$, $CH_2(C_6H_5)$, $COCH_3$, $COOCH_3$, and $CH_2OCH_3$;, with the case in which $R_1$, $R_2$, $R_3$, $R_4$, $R_5$, $R_1$, $R_2$', $R_3$', $R_4$', and $R_5$' all represent hydrogen atoms being excluded.

(Okamoto, col. 3, ll. 1-20) (Ans. 4 and 12). The Examiner also relies on the teaching of Embodiment 5, which Appellants agree is a teaching directed to an asymmetrical, though not dually substituted, metallocene precursor (Ans. 4; Br. 12). Thus, the Examiner concludes that "one of ordinary skill in the art would have readily envisaged using any combination of substituents within the scope of the formula, wherein these substituents need not be the same, since it would have been obvious that symmetric and asymmetric metallocenes were functional within the scope of Okamoto" (Ans. 12-13).

We agree with the Examiner that the broader formula encompasses the asymmetric dual substituted formula of claim 1. A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including non-preferred embodiments. *Merck & Co v. Biocraft Labs.*, 874 F.2d 804, 807 (Fed. Cir. 1989). In evaluating the prior art references for obviousness, it is proper to take into account not only the specific teachings of the references, but also any inferences which one skilled in the art would reasonably be expected to draw therefrom. *In re Preda*, 401 F.2d 825, 826, (CCPA 1968). Embodiment 5 provides sufficient evidence that one of ordinary skill in the art would have equally considered the asymmetrical substitutions encompassed by the general formula.

We cannot agree that the examples recited in Okamoto teach away from the other metallocene precursors supported by the broader general formula. Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or non-preferred embodiments. *In re Susi*, 440 F.2d 442, 446 n.3 (CCPA 1971).

Thus, we agree that the Examiner has established a prima facie case of obviousness.

Appellants further assert that Example 10 of their Specification, comparing films produced using 1-methyl,1'-ethyl ruthenocene and films produced using 1,1'-diethyl ruthenocene, show unexpectedly improved properties of films according to the present invention (Br. 5-6).

A patent applicant can rebut a *prima facie* case of obviousness by showing "unexpected results," *i.e.,* showing that the claimed invention possesses a superior property or advantage that a person of ordinary skill in the art would have found surprising or unexpected. *See In re Geisler,* 116 F.3d 1465, 1469 (Fed. Cir. 1997). However, Appellants must provide evidence of unexpected results commensurate in scope with the claimed subject matter. *See, e.g., In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005) ("Even assuming that the results were unexpected, Harris needed to show results covering the scope of the claimed range. Alternatively Harris needed to narrow the claims."); *In re Greenfield,* 571 F.2d 1185, 1189 (CCPA 1978) ("Establishing that one (or a small number of) species gives unexpected results is inadequate proof, for 'it is the view of this court that objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support.'") (quoting *In re Tiffin,* 448 F.2d 791, 792 (CCPA 1971)).

Appellants' sole example of improved performance using films made from an asymmetrical metallocene over films made from a symmetrical metallocene is insufficient evidence to show unexpected superior results are achieved for all of the asymmetrical metallocenes that fall within the scope of claim 1.

The evidence as a whole supports the Examiner's conclusion of obviousness under the law.

Appellants present no additional arguments directed to the rejection of claims 14, 15, 35, and 36, which adds Soininen as further evidence of obviousness (Br. 8). Thus, we cannot say that Appellants have overcome this additional rejection.

## III. CLAIMS 19 AND 20

Appellants separately address claims 19 and 20, as a group (Br. 7). Since the Examiner applies a different rationale in the rejections of claims 19 and 20 (Ans. 13-14), we address each of these claims separately below.

### A. ISSUES ON APPEAL

A second issue on appeal arising from the contentions of Appellants and the Examiner is: does the evidence support Appellants' view that the Examiner erred in concluding that a step of decomposing 1-methyl,1'-ethyl ruthenocene, as recited in claim 19, would have been obvious to one of ordinary skill in the art based on the teachings of Okamoto? We answer this question in the affirmative.

A third issue on appeal arising from the contentions of Appellants and the Examiner is: does the evidence support Appellants' view that the Examiner erred in concluding that a step of decomposing a metallocene precursor having a methyl substituent on a first cyclopentadienyl and a substituent on a second cyclopentadienyl selected from the group consisting of ethyl, propyl, isopropyl, n-butyl, sec-butyl and tert-butyl, as recited in claim 20, would have been obvious to one of ordinary skill in the art based on the teachings of Okamoto? We answer this question in the negative.

## B. DISCUSSION

With respect to claims 19 and 20, Appellants again assert that Example 10 of Appellants' Specification, comparing films produced using 1-methyl,1'-ethyl ruthenocene and films produced using 1,1'-diethyl ruthenocene, show unexpectedly improved properties for 1-methyl,1'-ethyl ruthenocene (Br. 7).

Okamoto teaches that methyl was a known ruthenocene substituent (Okamoto, col. 6, ll. 29-58) and that precursors having higher molecular weights are desired, resulting in increased vapor pressure and a more constant vaporization rate compared with conventional precursors (Okamoto, col. 3, ll. 39-48). Based on these teachings of Okamoto, the Examiner concludes that:

> it would have been obvious to one of ordinary skill to use a known substituent, such as methyl, with a bulkier substituent, such as ethyl, propyl, etc., in order to increase the molecular weight since Okamoto discloses that any of the substituents may include a bulky alkyl group and the incorporation of a higher molecular weight substituent with a methyl substituent would have reasonably been expected to provide a precursor having a

> higher molecular weight than a precursor having two methyl groups.

(Ans. 14.)

However, contrary to the teaching of Okamoto on which the Examiner's position relies, Appellants' data shows that 1-methyl,1'-ethyl ruthenocene, which is *less bulky and has a lower molecular weight* than 1,1'-diethyl ruthenocene due to the extra carbon atom in the 1,1'-diethyl ruthenocene, nonetheless exhibits *superior properties* and has a *higher vapor pressure* than 1,1'-diethyl ruthenocene (Br. 5-6; Spec. 42:14-43:16). Appellants' data runs counter to the Examiner's position and counter to Okamoto's teaching that higher molecular weight and higher vapor pressure yield improved properties. The Examiner has failed to address this discrepancy reported by Appellants. Accordingly, we cannot sustain the Examiner's rejection of claim 19.

With respect to claim 20, however, the Examiner contends that Appellants' Example 10 is not commensurate in scope with the claim (Ans. 14). Since claim 20 encompasses metallocene precursors other than 1-methyl,1'-ethyl ruthenocene, Appellants' sole example of improved performance is insufficient evidence to show unexpected superior results are achieved for all of the metallocenes that fall within the scope of claim 20. *See, e.g., Harris*, 409 F.3d at 1344; *Greenfield,* 571 F.2d at 1189.

Accordingly, we sustain the Examiner's rejection of claim 20.

## IV. CONCLUSION

On the record before us and for the reasons discussed above, we sustain the rejection maintained by the Examiner, with the exception of the Examiner's rejection of claim 19, which we do not sustain.

## V. DECISION

We affirm-in-part the Examiner's decision.

## VI. TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED-IN-PART

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